

The Periodic Table and the Elements



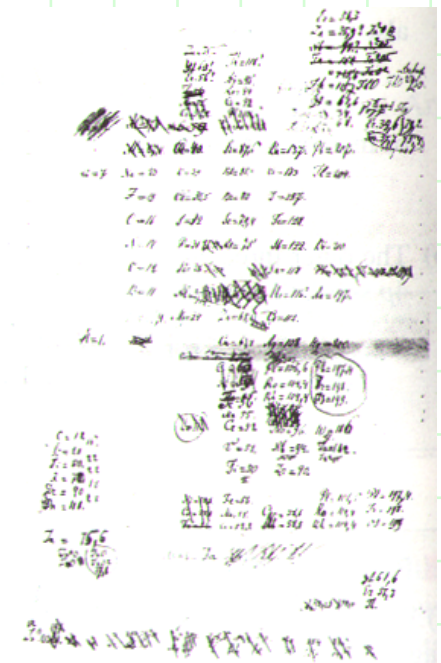
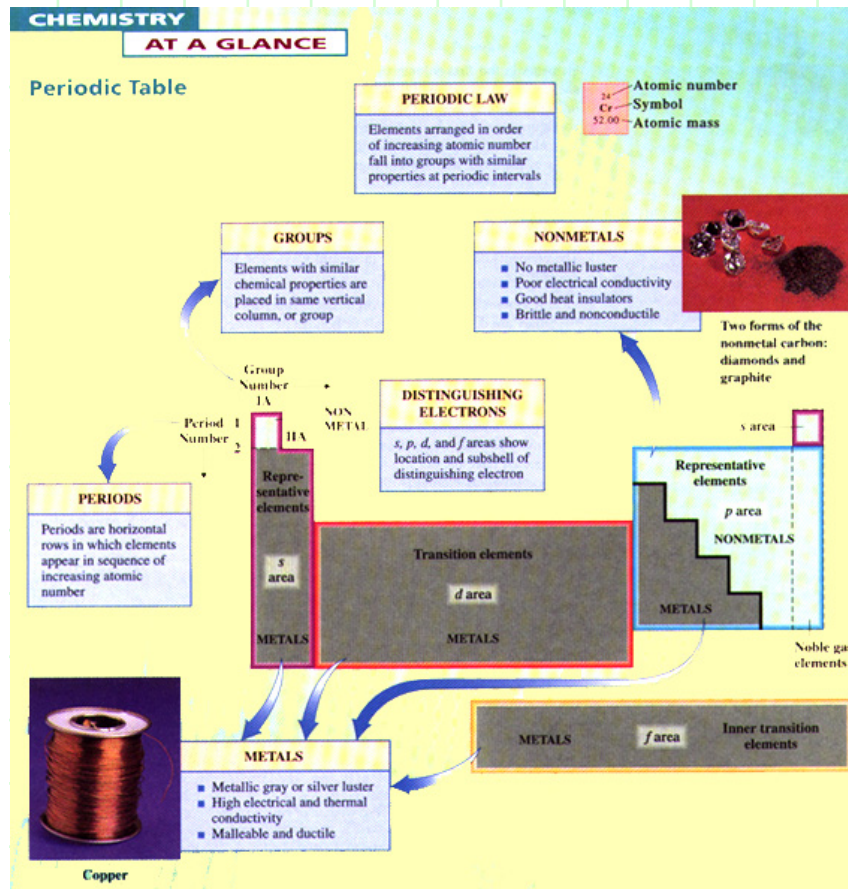
Physical Science
DSHS

The Periodic Table and the Elements

What is the periodic table ?

What information is obtained from the table ?

How can elemental properties be predicted base on the PT ?



Periodic Table

Known Elements in 1730's

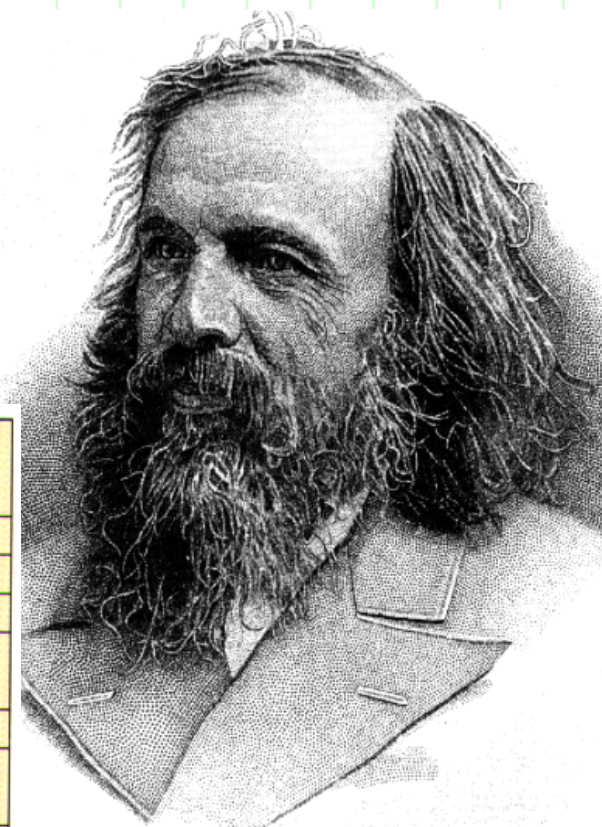
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	1 H	Atomic Sym	<div>6 C Carbon 12.0107</div> <div>[He]2s² 2p²</div>		<input type="radio"/> IUPAC Series ... Carbon	<input type="radio"/> Calculated Radius ... 67 pm								<div>1730</div>				2 He	
2	3 Li	4 Be			<input type="radio"/> State at 1730 K ... Solid	<input type="radio"/> Hardness ... Unknown								5 B	<div>6 C</div>	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg			<input type="radio"/> Melting Point ... 3823 K	<input type="radio"/> Modulus ... 33 GPa								13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca			21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
6	55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
7	87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo	
Select a year to dim elements discovered after that year.																			
Periodic Table Design & Interface Copyright © 1997 Michael Dayah. Ptable.com Last updated Oct 6, 2011																			
<div>57 La</div> <div>58 Ce</div> <div>59 Pr</div> <div>60 Nd</div> <div>61 Pm</div> <div>62 Sm</div> <div>63 Eu</div> <div>64 Gd</div> <div>65 Tb</div> <div>66 Dy</div> <div>67 Ho</div> <div>68 Er</div> <div>69 Tm</div> <div>70 Yb</div> <div>71 Lu</div>																			
<div>89 Ac</div> <div>90 Th</div> <div>91 Pa</div> <div>92 U</div> <div>93 Np</div> <div>94 Pu</div> <div>95 Am</div> <div>96 Cm</div> <div>97 Bk</div> <div>98 Cf</div> <div>99 Es</div> <div>100 Fm</div> <div>101 Md</div> <div>102 No</div> <div>103 Lr</div>																			

Dmitri Mendeleev (1869)

In 1869 Mendeleev and Lothar Meyer (Germany) published nearly identical classification schemes for elements known to date. The periodic table is based on the similarity of properties and reactivities exhibited by certain elements. Later, Henri Moseley (England, 1887-1915) established that each element has a unique atomic number, which is how the current periodic table is organized.

Row	Group I — R ₂ O	Group II — RO	Group III — R ₂ O ₃	Group IV RH ₄ RO ₂	Group V RH ₃ R ₂ O ₅	Group VI RH ₂ RO ₃	Group VII RH R ₂ O ₇	Group VIII — RO ₄
1	H = 1							
2	Li = 7	Be = 9.4	B = 11	C = 12	N = 14	O = 16	F = 19	
3	Na = 23	Mg = 24	Al = 27.3	Si = 28	P = 31	S = 32	Cl = 35.5	
4	K = 39	Ca = 40	— = 44	Ti = 48	V = 51	Cr = 52	Mn = 55	Fe = 56, Co = 59, Ni = 59, Cu = 63
5	(Cu = 63)	Zn = 65	— = 68	— = 72	As = 75	Se = 78	Br = 80	
6	Rb = 85	Sr = 87	?Yt = 88	Zr = 90	Nb = 94	Mo = 96	— = 100	Ru = 104, Rh = 104, Pd = 106, Ag = 108
7	(Ag = 108)	Cd = 112	In = 113	Sn = 118	Sb = 122	Te = 125	I = 127	
8	Cs = 133	Ba = 137	?Di = 138	?Ce = 140				
9								
10			?Er = 178	?La = 180	Ta = 182	W = 184		Os = 195, Ir = 197, Pt = 198, Au = 199
11	(Au = 199)	Hg = 200	Tl = 204	Pb = 207	Bi = 208			
12				Th = 231		U = 240		

<http://www.chem.msu.su/eng/misc/mendeleev/welcome.html>



Mendeleev.

Known Elements in 1870's

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H Atomic Sym																	2 He
2	3 Li	4 Be																10 Ne
3	11 Na	12 Mg																18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo
Select a year to dim elements discovered after that year.																		
Periodic Table Design & Interface Copyright © 1997 Michael Dayah. Ptable.com Last updated Oct 6, 2011																		
			57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
			89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

Periodic Table Expanded View

The Periodic Table was not always the way we see it. It has gone through many changes through the years. The most significant was the rearrangement of the Transition elements.

1																	2						
H																	He						
3	4																	5	6	7	8	9	10
Li	Be																	B	C	N	O	F	Ne
11	12																	13	14	15	16	17	18
Na	Mg																	Al	Si	P	S	Cl	Ar
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36						
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr						
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54						
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe						
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86						
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn						
87	88	89	104	105	106	107	108	109	110														
Fr	Ra	Ac	Rf	Ha	Sg	Ns	Hs	Mt	Unn														

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Period

Main Group

Noble Gases

1

1A

2

13

14

15

16

17

18

Key

1

Hydrogen

H

1.0079

Atomic number

Name

Symbol

Atomic weight

2

3

4

5

6

7

8

9

10

11

12

3

11

12

13

14

15

16

17

18

19

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86

87

88

7

87

88

132.905

137.34

204.37

207.19

208.980

(209)

210*

210*

222*

223*

226**

227*

231.04

237*

238.03

242**

243.06

247*

249**

251*

254*

257.095

258.10

259.10

260.105

260.105

260.105

260.105

260.105

260.105

260.105

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The Periodic Table

A map of the building blocks of matter.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H	Atomic Sym		C Solid														2 He
2	3 Li	4 Be	Hg Liquid															10 Ne
3	11 Na	12 Mg	H Gas															18 Ar
			Rf Unknown															
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

The Periodic Table

WHY DON'T WE DISPLAY

	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H	Atomic Sym																	2 He
2	3 Li	4 Be	<div><div>C</div>Solid</div>																10 Ne
3	11 Na	12 Mg	<div><div>Hg</div>Liquid</div>																18 Ar
4	19 K	20 Ca	<div><div>H</div>Gas</div>																36 Kr
5	37 Rb	38 Sr	<div><div>Rf</div>Unknown</div>																54 Xe
6	55 Cs	56 Ba																	86 Rn
7	87 Fr	88 Ra																	118 Uuo

Metalloids

Other nonmetals

Metals

Nonmetals

Alkali metals

Alkaline earth metals

Lanthanoids

Actinoids

Transition metals

Post-transition metals

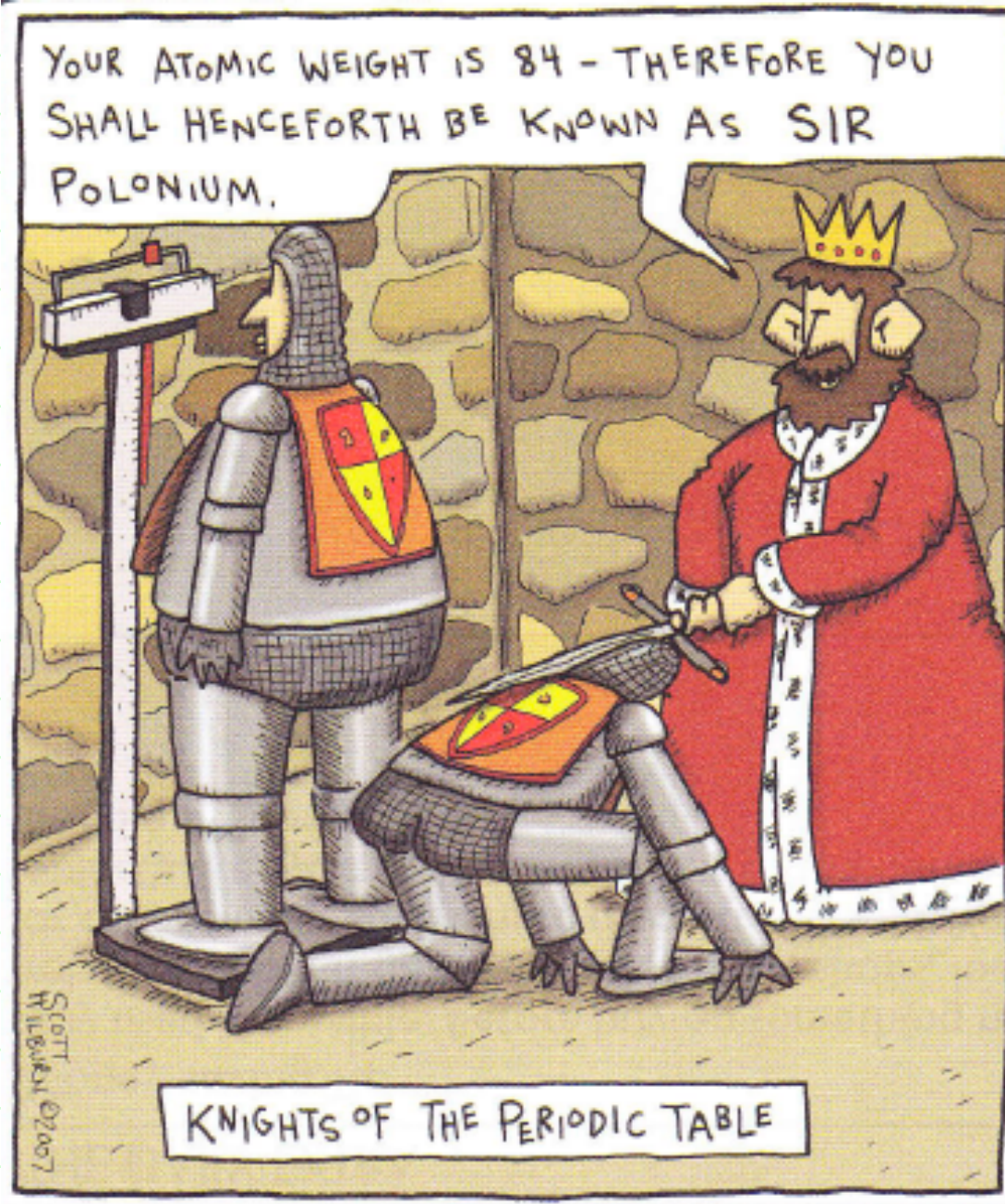
Halogens

Noble gases

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

THE PT THIS WAY?

Describe the Periodic Table



Describe how to read the periodic table:

Every square on the
table
has:

5

Atomic
Number

B

Atomic
Symbol

10.81

Atomic Mass

Atomic # and Atomic Mass

Increase as you move...

LEFT TO RIGHT
TOP TO BOTTOM

INCREASING

INCREASING

1 H	Atomic Sym	C Solid	Metalloids	Nonmetals	Other nonmetals	Halogens	Noble gases	273	2 He								
3 Li	4 Be	Hg Liquid							10 Ne								
11 Na	12 Mg	H Gas							18 Ar								
		Rf Unknown	Alkali metals	Alkaline earth metals	Lanthanoids	Actinoids	Transition metals	Post-transition metals									
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Describe the Periodic Table

Like the Protons and Neutrons, the

Total # of ELECTRONS

also increase on the PT as the as the Atomic # and Mass increase.

The periodic table is shown with two large orange arrows indicating the direction of increasing atomic number and mass. A vertical arrow on the left points downwards, labeled "INCREASING". A horizontal arrow at the top points to the right, labeled "INCREASING".

The table includes the following elements and their symbols:

Atomic #	Element	Sym	State
1	H	[C]	Solid
2	He	[H]	Gas
3	Li	[H]	Gas
4	Be	[H]	Gas
5	B	[H]	Gas
6	C	[H]	Gas
7	N	[H]	Gas
8	O	[H]	Gas
9	F	[H]	Gas
10	Ne	[H]	Gas
11	Na	[H]	Gas
12	Mg	[H]	Gas
13	Al	[H]	Gas
14	Si	[H]	Gas
15	P	[H]	Gas
16	S	[H]	Gas
17	Cl	[H]	Gas
18	Ar	[H]	Gas
19	K	[H]	Gas
20	Ca	[H]	Gas
21	Sc	[H]	Gas
22	Ti	[H]	Gas
23	V	[H]	Gas
24	Cr	[H]	Gas
25	Mn	[H]	Gas
26	Fe	[H]	Gas
27	Co	[H]	Gas
28	Ni	[H]	Gas
29	Cu	[H]	Gas
30	Zn	[H]	Gas
31	Ga	[H]	Gas
32	Ge	[H]	Gas
33	As	[H]	Gas
34	Se	[H]	Gas
35	Br	[H]	Gas
36	Kr	[H]	Gas
37	Rb	[H]	Gas
38	Sr	[H]	Gas
39	Y	[H]	Gas
40	Zr	[H]	Gas
41	Nb	[H]	Gas
42	Mo	[H]	Gas
43	Tc	[H]	Gas
44	Ru	[H]	Gas
45	Rh	[H]	Gas
46	Pd	[H]	Gas
47	Ag	[H]	Gas
48	Cd	[H]	Gas
49	In	[H]	Gas
50	Sn	[H]	Gas
51	Sb	[H]	Gas
52	Te	[H]	Gas
53	I	[H]	Gas
54	Xe	[H]	Gas
55	Cs	[H]	Gas
56	Ba	[H]	Gas
57-71	Lanthanoids	[H]	Gas
72	Hf	[H]	Gas
73	Ta	[H]	Gas
74	W	[H]	Gas
75	Re	[H]	Gas
76	Os	[H]	Gas
77	Ir	[H]	Gas
78	Pt	[H]	Gas
79	Au	[H]	Gas
80	Hg	[H]	Gas
81	Tl	[H]	Gas
82	Pb	[H]	Gas
83	Bi	[H]	Gas
84	Po	[H]	Gas
85	At	[H]	Gas
86	Rn	[H]	Gas
87	Fr	[H]	Gas
88	Ra	[H]	Gas
89-103	Actinoids	[H]	Gas
104	Rf	[H]	Gas
105	Db	[H]	Gas
106	Sg	[H]	Gas
107	Bh	[H]	Gas
108	Hs	[H]	Gas
109	Mt	[H]	Gas
110	Ds	[H]	Gas
111	Rg	[H]	Gas
112	Cn	[H]	Gas
113	Uut	[H]	Gas
114	Uuq	[H]	Gas
115	Uup	[H]	Gas
116	Uuh	[H]	Gas
117	Uus	[H]	Gas
118	Uuo	[H]	Gas

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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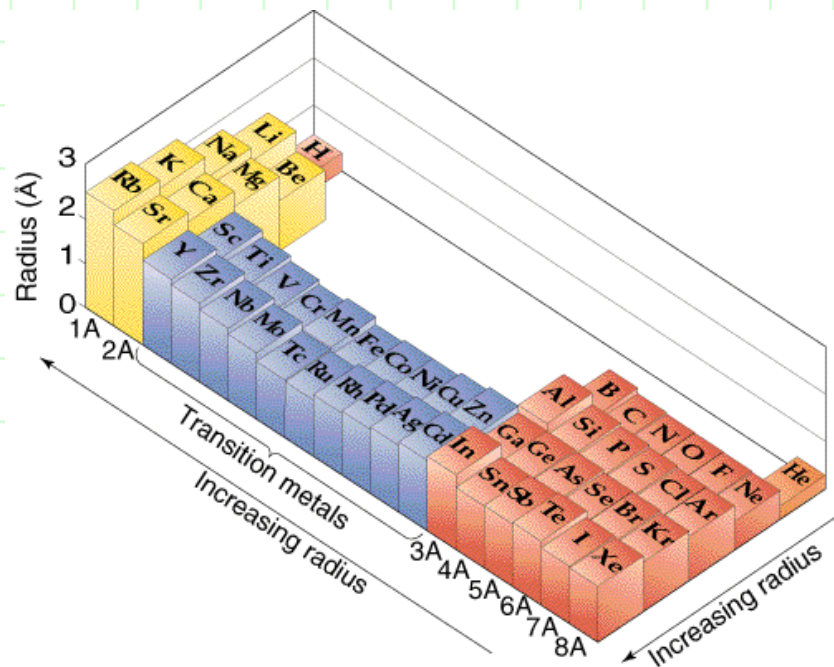
Trend in Atomic Radius

Atomic Radius:

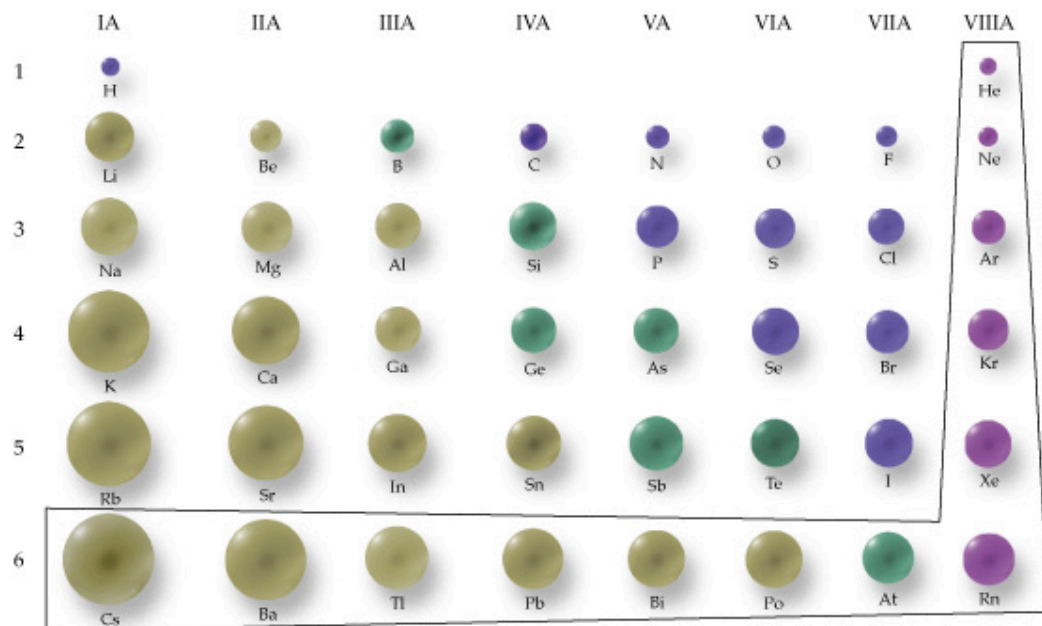
WARNING:

**NOT THE SAME AS ATOMIC #
AND MASS**

WHY?



Relative Atomic Sizes of the Representative Elements



Sizes of atoms
tend to
increase
down a group

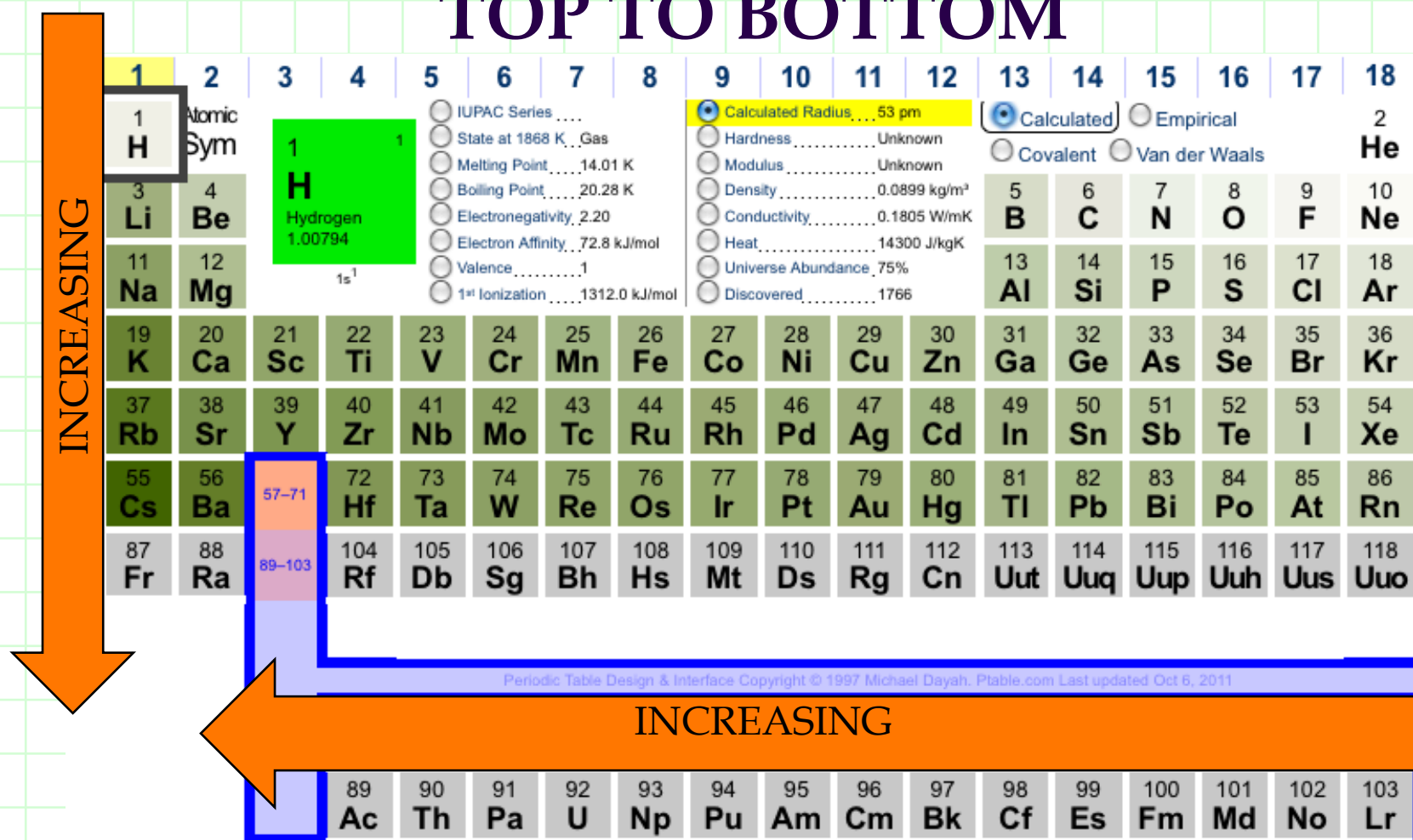
Sizes of atoms tend to
decrease across a period

Trend in Atomic Radius

Increase as you move...

RIGHT TO LEFT

TOP TO BOTTOM



Reading the Periodic Table: Classification

Nonmetals
 Metals
 Metalloids
 Noble gases

IA

IIA

IIIA

IVA

VA

VIA

VIIA

VIII

1
H

2
He

3
Li

4
Be

5
B

6
C

7
N

8
O

9
F

10
Ne

11
Na

12
Mg

13
Al

14
Si

15
P

16
S

17
Cl

18
Ar

19
K

20
Ca

21
Sc

22
Ti

23
V

24
Cr

25
Mn

26
Fe

27
Co

28
Ni

29
Cu

30
Zn

31
Ga

32
Ge

33
As

34
Se

35
Br

36
Kr

37
Rb

38
Sr

39
Y

40
Zr

41
Nb

42
Mo

43
Tc

44
Ru

45
Rh

46
Pd

47
Ag

48
Cd

49
In

50
Sn

51
Sb

52
Te

53
I

54
Xe

55
Cs

56
Ba

57
La

72
Hf

73
Ta

74
W

75
Re

76
Os

77
Ir

78
Pt

79
Au

80
Hg

81
Tl

82
Pb

83
Bi

84
Po

85
At

86
Rn

87
Fr

88
Ra

89
Ac

104
Rf

105
Db

106
Sg

107
Bh

108
Hs

109
Mt

110
Uun

111
Uuu

112
Uub

114

116

118

Rare earth elements

58
Ce

59
Pr

60
Nd

61
Pm

62
Sm

63
Eu

64
Gd

65
Tb

66
Dy

67
Ho

68
Er

69
Tm

70
Yb

71
Lu

90
Th

91
Pa

92
U

93
Np

94
Pu

95
Am

96
Cm

97
Bk

98
Cf

99
Es

100
Fm

101
Md

102
No

103
Lr

Lanthanides

Actinides

The metals, nonmetals, and metalloids

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Periodic Table: Metallic arrangement

Layout of the Periodic Table: Metals vs. nonmetals

THE STAIRCASE

1 IA	2 IIA												13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	2																	
3	4	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIII	10	11 IB	12 IIB							
4	5																	
5	6																	
6	7																	
7	8																	

Layout of: Metals vs. Nonmetals vs. Metalloids

Quick Elements

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo
		58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu		
		90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		

Tables

List

Periodic Table: The three broad Classes

Main (Representative), Transition metals, lanthanides and actinides (rare earth)

Quick Elements

1 H																	2 He
3 Li	4 Be	<div>Representative Elements</div> <div>Transition Elements</div> <div>Rare Earth Metals</div>										5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

Rare earth elements

Lanthanides

Actinides

58 Ce 140.115	59 Pr 140.908	60 Nd 144.24	61 Pm 145	62 Sm 150.36	63 Eu 151.964	64 Gd 157.25	65 Tb 158.925	66 Dy 162.5	67 Ho 164.93	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.967
90 Th 232.038	91 Pa 231.036	92 U 238.029	93 Np 237.048	94 Pu 244	95 Am 243	96 Cm 247	97 Bk 247	98 Cf 251	99 Es 252	100 Fm 257	101 Md 258	102 No 259	103 Lr 262

Tables

List

Describe the Periodic Table

Rows (and/or PERIODS) -

Elements of each row have the same number of Total energy levels (shells).

Columns (and/or GROUPS /FAMILIES)-

Elements have the same number of electrons in the outermost energy level or shell (Pattern for Representative/Main Groups Only).

Elements in the same family have similar properties

Across the Periodic Table

Periods: Are arranged horizontally across the periodic table
(Rows 1-7)

These elements have the same number of Total Energy Levels or shells.

The diagram illustrates the periodic table with the following components:

- Periods:** The vertical axis is labeled with red numbers 1 through 7, representing the periods.
- Groups:** The horizontal axis is labeled with blue numbers and letters: 1 IA, 2 IIA, 3 IIIB, 4 IVB, 5 VB, 6 VIB, 7 VIIB, 8 VIIIB, 9 IB, 10 IIB, 11 IIIB, 12 IVB, 13 VA, 14 VIA, 15 VIIA, 16 VIIIA, 17 VIIIA, and 18 VIIIA.
- Color Coding:**
 - Yellow:** s-orbitals (Groups 1 and 2).
 - Pink:** p-orbitals (Groups 13 through 18).
 - Light Orange:** d-orbitals (Groups 3 through 10).
 - Dark Orange:** f-orbitals (Groups 11 through 18).
- 2nd Period:** A horizontal line labeled "2nd Period" spans from Group 1 to Group 18.
- 6th Period:** A horizontal line labeled "6th Period" spans from Group 1 to Group 18.
- Thick Black Arrows:**
 - An arrow points from the 2nd period to the 6th period, indicating the transition from s-orbitals to p-orbitals.
 - An arrow points from the 6th period to the 18th period, indicating the transition from p-orbitals to d-orbitals.
 - An arrow points from the 18th period to the 18th period, indicating the transition from d-orbitals to f-orbitals.

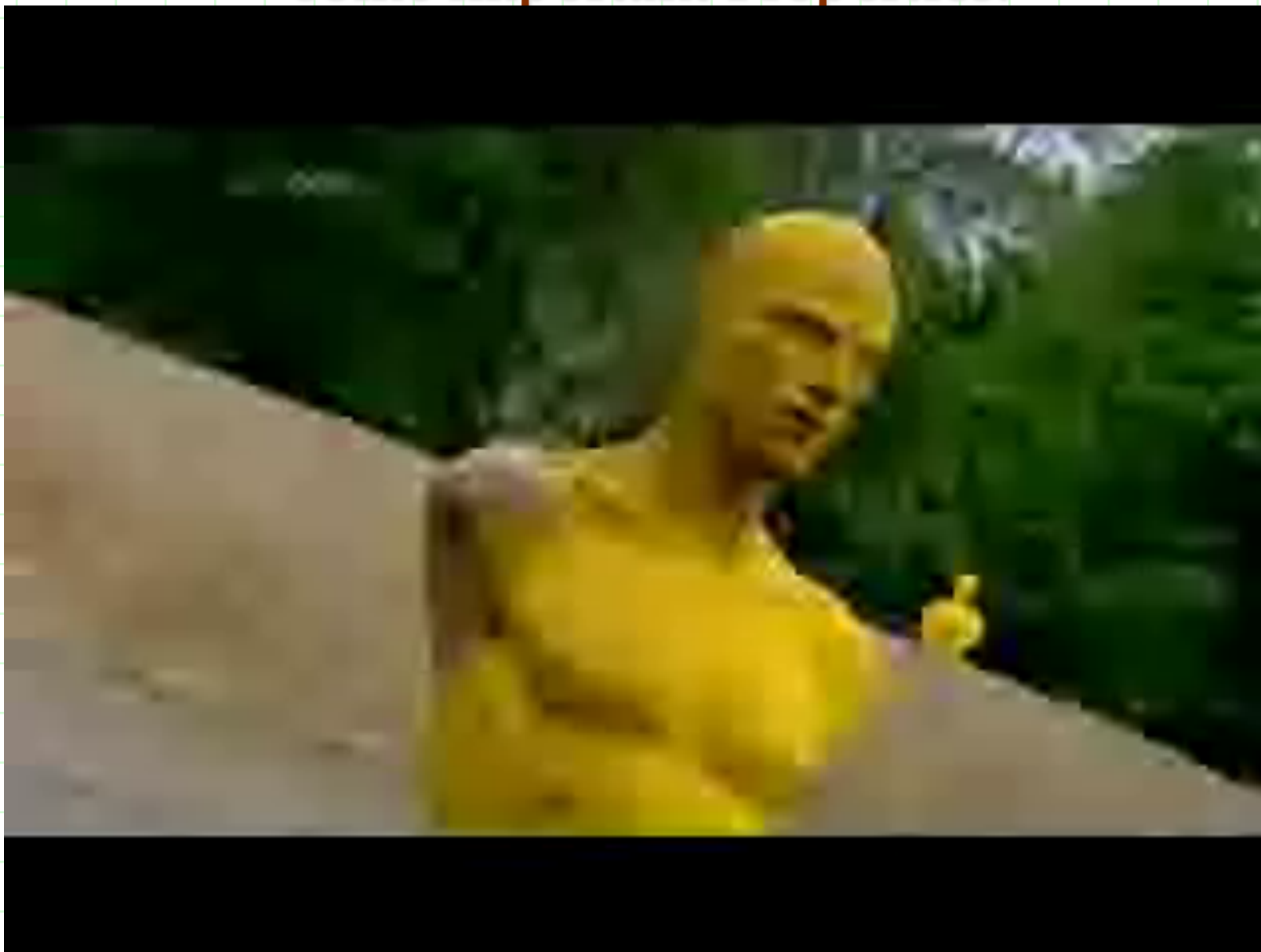
Down the Periodic Table

Families: or groups, 1- 18 or 1-8 (MAIN)]

These elements have the same number of electrons in the outermost shells
(the Valence shell).

	1 IA	2 IIA											13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1																		
2																		
3			3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIII	10	11 IB	12 IIB						
4																		
5																		
6																		
7																		

Notable families of the Periodic Table and some important Properties:



Infamous Families of the Periodic Table

Alkali Metals

Alkali Metals

	1	2	3	4										14	15	16	17	18
1	1 H	Atomic Sym																2 He
2	3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne										
3	11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar										
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

Metalloids

Other nonmetals

Halogens

Noble gases

Alkali metals

Alkaline earth metals

Lanthanoids

Actinoids

Transition metals

Post-transition metals

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Infamous Families of the Periodic Table

Alkaline Earth Metals

	1	2	3	4	5	Metals																6	7	8	9	10
1	1 H	2 He																								2 He
2	3 Li	4 Be																								
3	11 Na	12 Mg																								
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr								
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe								
6	55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn								
7	87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo								

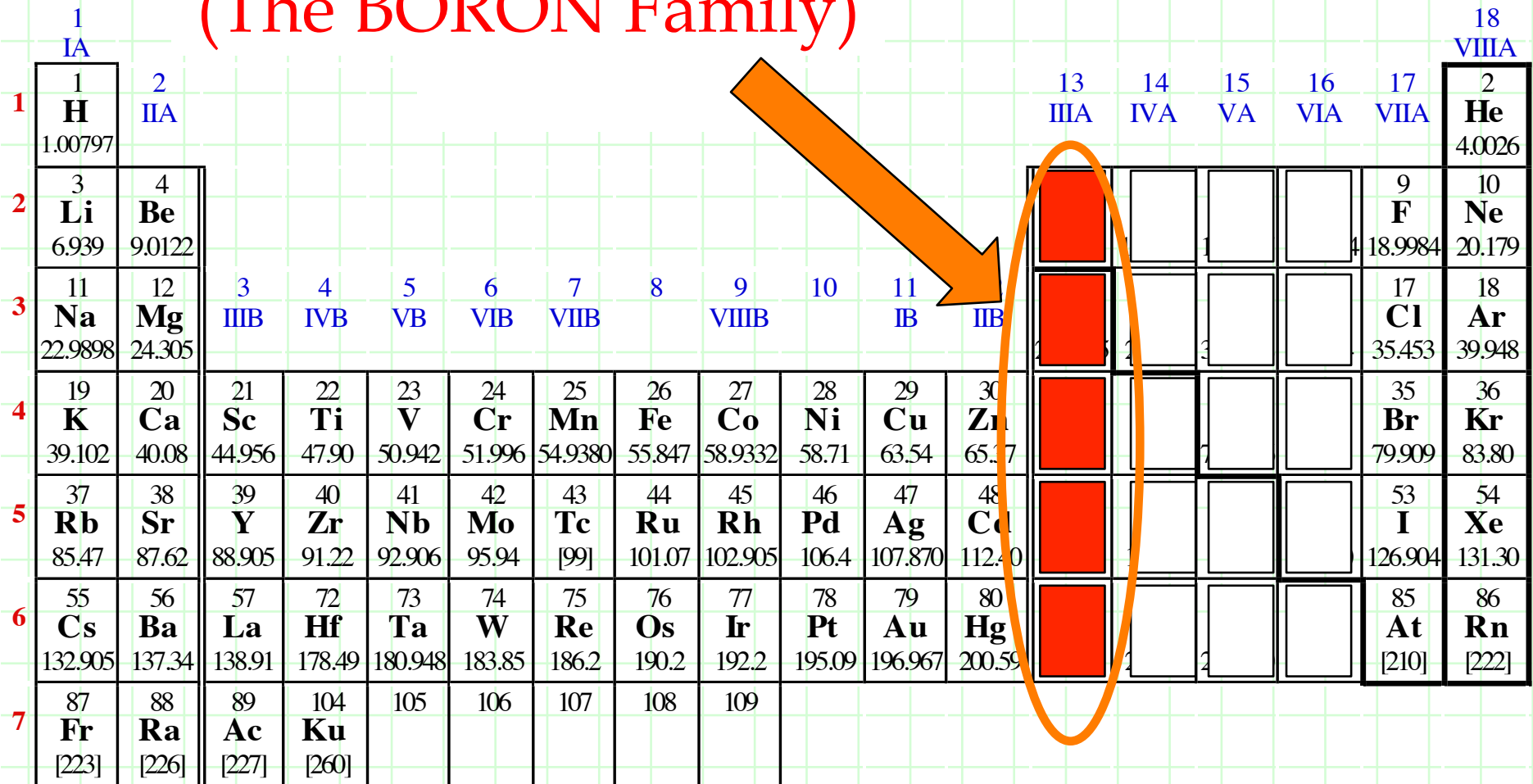
For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Infamous Families of the Periodic Table

Family #3 (The BORON Family)



1 IA	2 IIA											13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1 H 1.00797																	2 He 4.0026
3 Li 6.939	4 Be 9.0122															9 F 18.9984	10 Ne 20.179
11 Na 22.9898	12 Mg 24.305	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIII B	10	11 IB						17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37					35 Br 79.909	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc [99]	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40					53 I 126.904	54 Xe 131.30
55 Cs 132.905	56 Ba 137.34	57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59					85 At [210]	86 Rn [222]
87 Fr [223]	88 Ra [226]	89 Ac [227]	104 Ku [260]	105	106	107	108	109									

Infamous Families of the Periodic Table

Family #4 (The CARBON Family)

1 IA	2 IIA											13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1 H 1.00797																	2 He 4.0026
3 Li 6.939	4 Be 9.0122															9 F 18.9984	10 Ne 20.179
11 Na 22.9898	12 Mg 24.305	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIII B	10	11 IB	12 IIB					17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37					35 Br 79.909	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc [99]	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40					53 I 126.904	54 Xe 131.30
55 Cs 132.905	56 Ba 137.34	57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59					85 At [210]	86 Rn [222]
87 Fr [223]	88 Ra [226]	89 Ac [227]	104 Ku [260]	105	106	107	108	109									

Infamous Families of the Periodic Table

Family #5 (The NITROGEN Family)

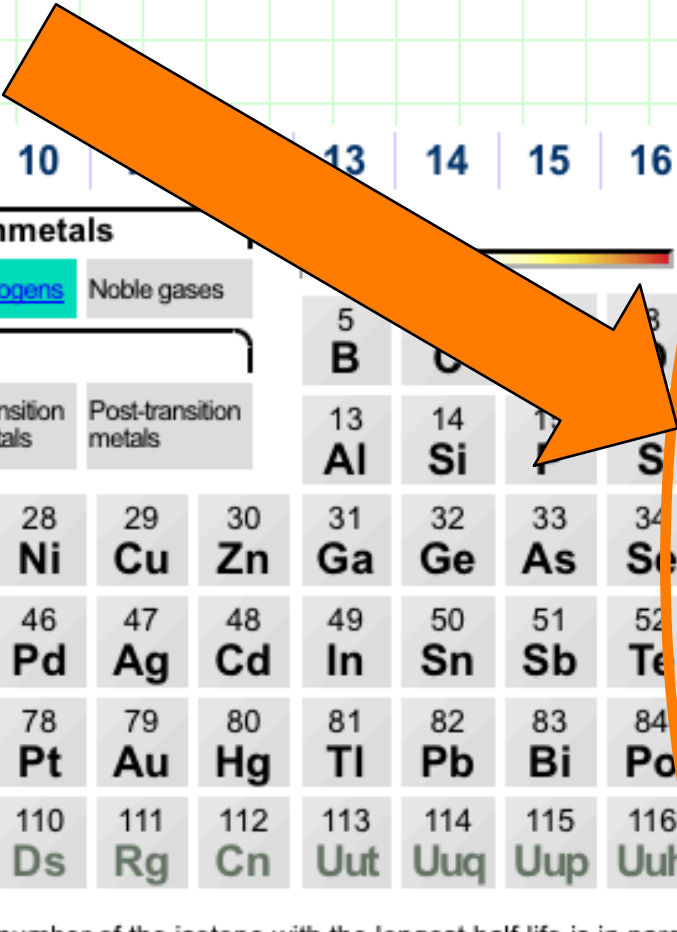
1 IA	2 IIA											13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1 H 1.00797																9 F 18.9984	10 Ne 20.179
2 Li 6.939	4 Be 9.0122															17 Cl 35.453	18 Ar 39.948
3 Na 22.9898	12 Mg 24.305	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB					35 Br 79.909	36 Kr 83.80
4 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37					53 I 126.904	54 Xe 131.30
5 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc [99]	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40					85 At [210]	86 Rn [222]
6 Cs 132.905	56 Ba 137.34	57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59						
7 Fr [223]	88 Ra [226]	89 Ac [227]	104 Ku [260]	105	106	107	108	109									

Infamous Families of the Periodic Table

OXYGEN FAMILY																	
1 IA	2 IIA											13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIII
1 H 1.00797																	2 He 4.0026
3 Li 6.939	4 Be 9.0122															9 F 18.9984	10 Ne 20.179
11 Na 22.9898	12 Mg 24.305	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB				17 Cl 35.453	18 Ar 39.948	
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37				35 Br 79.909	36 Kr 83.80	
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc [99]	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40				53 I 126.904	54 Xe 131.30	
55 Cs 132.905	56 Ba 137.34	57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59				85 At [210]	86 Rn [222]	
87 Fr [223]	88 Ra [226]	89 Ac [227]	104 Ku [260]	105	106	107	108	109									

Infamous Families of the Periodic Table

HALOGENS



	1	2	3	4	5	6	7	8	9	10		13	14	15	16	17	18
1	1 H	Atomic Sym	C Solid														2 He
2	3 Li	4 Be	Hg Liquid														10 Ne
3	11 Na	12 Mg	H Gas														18 Ar
4	19 K	20 Ca	Rf Unknown														36 Kr
5	37 Rb	38 Sr															54 Xe
6	55 Cs	56 Ba															86 Rn
7	87 Fr	88 Ra															118 Uuo

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Infamous Families of the Periodic Table

NOBLE GASES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H	Atomic Sym	2 He Helium 4.002602															2 He
2	3 Li	4 Be																10 Ne
3	11 Na	12 Mg																18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Infamous Families of the Periodic Table

LANTHANIDES

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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Infamous Families of the Periodic Table

ACTINIDES

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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Infamous Groups / Families of the Periodic Table

Quick Elements

1 H																	2 He
3 Li	4 Be	Alkali Metals		Alkaline Earth Metals		5 B	6 C	7 N	8 O	9 F	10 Ne						
11 Na	12 Mg	Transition Metals		Lanthanides		13 Al	14 Si	15 P	16 S	17 Cl	18 Ar						
		Actinides		Halogens													
		Noble Gases															
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo
		58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu		
		90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		

Tables

List

How do the Elements Exist

At Room Temperature (25°C)

90% are SOLIDS

290 Kelvin
17 °Celsius
62 °Fahrenheit

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57-71 Lanthanides	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89-103 Actinides	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Uup	116 Uuh	117 Uus	118 Uuo
57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu			
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr			

How do the Elements Exist At Room Temperature (25°C)

Red = GASES

290 Kelvin
17 °Celsius
62 °Fahrenheit

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H	2 He																
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

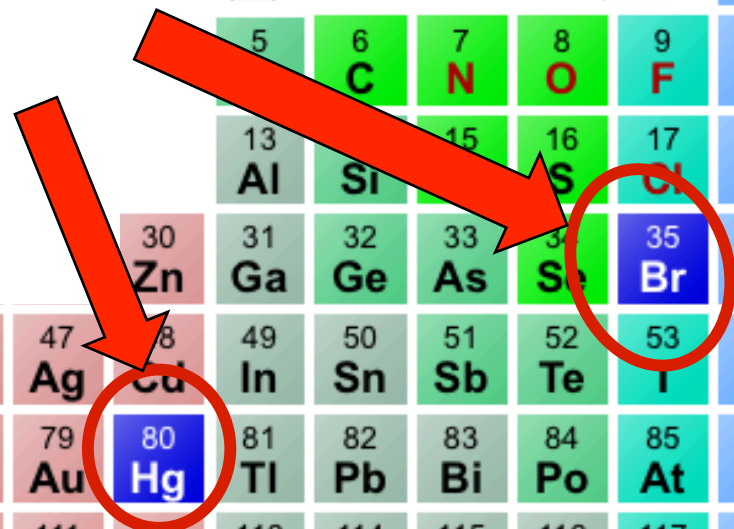
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57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

How do the Elements Exist At Room Temperature (25°C)

	1	2	3	4	5		12	13	14	15	16	17	18
1	1 H	Atomic Sym		C Solid									2 He
2	3 Li	4 Be	Hg Liquid										10 Ne
3	11 Na	12 Mg	H Gas										18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V								36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cu	54 Xe
6	55 Cs	56 Ba	57-71	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	86 Rn
7	87 Fr	88 Ra	89-103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	118 Uuo

There are only
2 Elements
That =
Liquids



For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

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57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Summary

Periodic Table: Map of the Building block of matter

Type: Metal, Metalloid and Nonmetal

Family/Group: Elements in the same column have similar chemical property because of similar valence electrons

Alkali, Alkaline, Family #3 (Boron), #4 (Carbon), #5 (Nitrogen), #6 Oxygen family, Halogens, Noble gases, Transition metals, Representative (main), Rare Earth Metals (Lanthanides, Actinides)

Period: Elements in the same row have the same number of energy levels and/or electron shells.

Click the link below for an interactive and informative periodic table.

<http://www.dayah.com/periodic/>

Or...

App Store > Reference > Quick Learning LLC



Quick Periodic Table of the Elements

Description

Quick Elements offers rapid access to information on the elements useful periodic tables summarize a variety of information. Separate screens for . Access to that data is provided by a searchable list of elements that the u

Quick Periodic Table of the Elements Support >

Free App